

OBSERVATIONS ON THE MICRO-FAUNA OF AN OREGON POND

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WITH ONE PLATE

The material under consideration in this paper is from north-western Oregon, a region almost completely separated from the rest of the continent by high mountain ranges on the east and south and bounded on the west by the ocean. This part of Oregon is conspicuous for the absence of large bodies of standing water. Only small ponds, such as the one to be described, are found.

The only data on the micro-fauna of this part of the West concern Seattle, Washington, and Crater Lake, Oregon. There are a few records also from Spokane, Washington, and from the Flat-head region of Montana and British Columbia which, although east of the Cascade Mountains, belong to the Columbia system of drainage. These localities are widely separated from each other as well as from the pond studied, which is near Forest Grove, Oregon.

It is interesting to notice that, although so separated from the rest of the continent, the species, except a few new or very rare forms, are those commonly found in similar bodies of water.

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Todd's Pond (plate VI, fig. 1) is about a mile in length and a half a mile in width. It is fed by a stream which arises from mountain springs and is augmented by water from the tile ditches draining neighboring farming land. This stream flows for some distance through swampy land covered with willow, maple, fir, and ash trees. Where it enters the pond the stream is about thirty feet wide and three feet deep. Its bed is of mud and a thick growth of pond-lilies and other water plants fills the stream. The water is

sluggish but clear. The pond itself is shallow, six inches to two feet in depth. On the south and west the bank rises rapidly to high pasture and farm lands. On the north and east the pond ends in a swamp filled with rushes. There is a dense growth of pond-lilies, cat-tails, willows, rushes, many algae and other water plants, filling the pond, and its south end is covered with a thick growth of willow, ash, and, a little distance from the water, fir, maple, cedar, and oak trees. The vegetation is so dense that during the summer the water is only visible in small areas. The bed is of mud, covered with a thick layer of debris, decaying vegetable matter. Many trees have fallen into the pond where the partly decayed, moss-covered trunks remain. The water is clear but slightly yellow. The color is probably due to the wash of fir forests near by. There is no odor from the water except in very dry seasons when the water is exceptionally low. The pond was much larger until a few years ago, when the beaver dams at the outlet were blown out to keep the stream open.

The dense growth of vegetation in the pond, the shallow water and the forests of large fir trees within a sort distance on all sides make it impossible for the light breezes that occur during the summer to have much effect in stirring the water. During the entire summer the water was never moved enough to prevent its being clear, although the bed was of such loose light debris that great care was necessary in collecting to prevent the net from becoming filled. The elevation is about one hundred feet above the sea level.

Collections were made two or three times a week from July 7 till August 25, 1905. Each time specimens were taken from a bridge crossing the inlet (plate VI, fig. 1, *B*) and from the west side of the pond (plate VI, fig. 1, *W*). Collections were also made from the same places in the summer of 1906. The fauna of the two stations differed in such minor points that they are considered together.

The following table gives the species and their relative abundance on each day. The signs —, +, and *, indicate, respectively, rare, medium, and abundant.

	July 7	July 10	July 13	July 18	July 23	July 29	August 1	August 5	August 7	August 11	August 15	August 25
<i>Volvox spermatosphara</i>	*	*	+	+	*		*	—	*	+	+	—
<i>Volvox perglobator</i>	*		+				*		*		+	—
<i>Eudorina elegans</i>	+				+				+		+	—
<i>Pandorina morum</i>									+		—	—
<i>Stentor pyriformis</i>	*	*	*	*	*	*		+		—	—	—
<i>Hydra viridis</i>	—		+	+		—	—	—		—	—	—
<i>Dero limosa</i>			—	+		+	—	—			—	—
<i>Dorylaimus attenuatus</i>			+	+	+	+	+	—			—	—
<i>Trilobus pellucidus</i>			+	+	+	+	+	—			—	—
<i>Monostyla bulla</i>	+	+	*	+	+	+	+	+	—	+	—	—
<i>Monostyla lunaris</i>	+	+	+	+	+	+	+	+	—	—	+	—
<i>Anuraea aculeata</i>		+	*	+	+	+	+	+	—	—	—	—
<i>Anuraea hypelasma</i>			+		*	*	*	+	—	—	—	—
<i>Anuraea cochlearis</i>		+	+	+	+	+		+	—	—	—	—
<i>Diurella stylata</i>		+	+		+		+		—	—	—	—
<i>Polyarthra platyptera</i>		+	*	+	*	*	*	+	—	+	—	—
<i>Furcularia longiseta</i>									—	—	—	—
<i>Cathypna luna</i>	+	+	*	+	+	+	+		+	+	—	—
<i>Pterodina (elliptica?)</i>	+	+	*	+	+	+	*	+	—	+	—	—
<i>Salpina mucronata</i>		+	*	+	+	+			—	—	—	—
<i>Metopidia lepadella</i>	+	+	*	+	+	+	+		—	—	—	—
<i>Euchlanis deflexa</i>	—	+	*	+	+	+	+		+	—	—	—
<i>Dinocharis tetracis</i>	—	+	+	—	—	—	—		+	—	—	—
<i>Cyclops prasinus</i>	*	*		*	*	*	*	*	+	*	*	*
<i>Cyclops albidus</i>	—	+	*	*			+	+	+	+	+	+
<i>Cyclops serrulatus</i>	—		*		+	—	—	+	+	+	—	—
<i>Cyclops fimbriatus</i>			—		—	—	—	—	—	—	—	—
<i>Cyclops viridis</i>	—	—			—		—	—	—	—	—	—
<i>Pleuroxus denticulatus</i>		+	+		+	+	+	—		*	+	*
<i>Alona intermedia</i>				—			+		+	+	+	+
<i>Simocephalus vetulus</i>			+	+		+	+			+	+	+
<i>Eurycerus lamellatus</i>		+	+	+	+	+	*			+	—	—
<i>Scapholeberis mucronata</i>			—			—	—	—		—	—	—
<i>Macrothrix laticornis</i> var.											—	—
<i>Chydorus sphaericus</i>						—		—			—	—
<i>Cypris ophthalmica</i>	*	*	+	+	*	*	*	*	*	*	—	—
<i>Chironomid larva</i>	—	—	—	*	*	+	*	+	—	—	—	—
<i>Culicid larva</i>	—	—					—	—	+	—	—	—

	July 7	July 10	July 13	July 18	July 23	July 29	August 1	August 5	August 7	August 11	August 15	August 25
May-fly larva.....	—	+	+	+		+	*		+			
Hydrobatid bug larva.....					—							—
Beetle larva (Gallerucella)...					—							
May-fly nymph (Baetis sp.)...							—		—	—		
Corisid larva.....							—		—	—		
Dragon-fly larva.....									—	—	—	
Hemipterous larva (Corisid) ..									—	—	—	
Beetle (Cnemidotus sp.).....											—	
Mideopsis orbicularis.....	—				+		—	—				
Limnesia histronica.....		—			+		—	—				
Limnesia undulata.....			—	—		+	—	—				
Limnesia sp., juv.....			—	—		—	—	—				
Piona reighardi.....		—	—				—	—				
Piona sp., juv.....							—	—				
Lebertia sp., undet.....				—								—
Unionicola crassipes.....					—			*				
Arrhenurus prominulus.....					—	+		—	—	—	—	
Arrhenurus sp., juv.....					—	—						
Arrhenurus krameri.....												
Atractides sp., juv.....								—				
Oxus sp., undesc.....							—					—
Diplodontus despicens.....									—			—
Laminipes sp., undesc.....											—	—
Neumania sp., undet.....												—

Protozoa were rare in species but abundant in individuals. Both *Volvox spermatosphara* and *Volvox perglobator* were extremely numerous until the middle of August. *Endorina elegans* and *Pandorina norum* were only moderately abundant. All are widely distributed forms, found in ponds and ditches both large and small. The two species of *Volvox* are purely American and only recently described (Powers, 1907 and 1908). *Volvox perglobator* is found in all parts of the United States. *Volvox spermatosphara* has, as yet, only been found in the central and western states. I find no data on the Volvocaceae west of the Rocky Mountains.

Stentor pyriformis was described by Johnson (1893) as a new species. He found it only in one body of water, Lake Quinsigamond, Worcester, Massachusetts. The form found on the Pacific coast agrees with the above very closely in all points which Johnson describes. In my specimens, however, the frontal field is somewhat narrower than the diameter of the body just below (plate vi,

figs. 2 and 3). A few individuals were found showing the new peristome forming as is typical for *S. coeruleus*. This was not described by him. The macronuclei were typically two, but one specimen was found with only one and another with three. The macronucleus (pl. VI, fig. 4) varies in diameter from 40μ to 45μ and is surrounded by a large but variable number of micronuclei, as Johnson describes for *S. igneus*. The body is 255μ wide and 357μ long. *Stentor pyriformis* was very abundant during July and August and especially so during the former month. It was found in equal abundance in the summer of 1906.

Hydra viridis was present in moderate abundance in a few collections and isolated specimens were found at other times. No attempt was made to collect *Hydra* and it was probably the accidental scraping of the stems of water plants that caused its presence at all. This species is widely distributed, but has not been recorded before from the northwest.

The worms were of very moderate numbers. *Dero limosa* is very widely distributed. It is reported from the Philippines, England, Africa and North America in bodies of fresh water. *Dorylaimus attenuatus* is found in wet earth and ooze in Germany. No account of it was found for America. *Trilobus pellucidus* is found in mud, slime, and ooze at the bottom of ponds, streams and ditches in Germany and England. None of these forms have been recorded from any northwestern locality.

Rotifers were quite abundant in all collections. Fourteen species were found and all were fairly abundant in individuals except *Furcularia longiseta*. This was only found in small numbers on one day. Of the forms found (see table) all, except *Anuraea hypelasma*, are widely distributed, being found all over the world in all kinds of bodies of water. They are especially abundant in ponds of the type under consideration, where there is a great deal of vegetation. In addition to the species given in the table there was a large soft rotifer, probably belonging to the Notommatidæ, which was too badly contracted for identification. This was quite abundant. There were also a number of specimens of a form belonging to the Philodinidæ, but these were also too badly contracted for identification.

The Copepoda were quite abundant in all collections taken, but were slightly less so in the latter part of August. All of the species found are widely distributed ones. *Cyclops prasinus* was the abundant form. It is reported elsewhere as widely distributed but few in numbers. Here it occurred in very great abundance, far outnumbering all other Copepoda. It is found in ponds, rivers, ditches, lakes, and even wayside puddles, and distributed over the eastern and central United States, but is not found in the collections noted previously from the far west. Its location as well as its abundance are unusual. *Cyclops albidus* and *Cyclops serrulatus* were second in abundance. Both are reported as very abundant forms everywhere. They are present in nearly all collections from all parts of America. They are found in temporary ponds, rivers and even wells. They are among the most common forms from the mountains of the northwest, even occurring in Crater Lake, Oregon. This is the nearest place from which this form is mentioned definitely. *Cyclops fimbriatus* is a rare form found throughout the central states from Manitoba to Alabama. *Cyclops viridis* is one of the most common forms in temporary ponds and other bodies of water in Illinois, Ontario, Iowa, and northwestern Colorado, as well as in the mountains of the northwest. It has been found at Spokane, Washington, which, although east of the Cascade Mountains, belongs to the Columbia system.

The Cladocera were not abundant either in species or individuals. All of the forms are widely distributed and have been found in the southern, eastern, northern and middle states. *Pleuroxus denticulatus* was the most abundant form. It has been found in the southern and middle states, but I find no mention of it farther west than Nebraska. *Simocephalus vetulus* is abundant over the northern hemisphere in all the more shallow lakes among vegetation, as well as in some large lakes. It prefers the more shallow, clear cold water. This form as well as the three following below are also reported (Forbes, 1891) from the Yellowstone Park and from the Flathead region, Montana. *Eurycercus lamellatus* has much the distribution of *Simocephalus vetulus*, but it is more common in the deeper, clear waters. *Chydorus sphericus* is abundant in smaller lakes over the whole circumpolar land area. The above four forms,

found in the Flathead region of Montana, are of especial interest here because this belongs to the Columbia system of drainage. *Alona intermedia* is found in various parts of the United States. *Macrothrix laticornis* undoubtedly represents a new variety. The species is widely distributed in Europe and is found in Minnesota and New Mexico. The specimens found differ from the type as described by Herrick and Turner (1895), as follows: The body is 450μ long. The antennule (pl. vi, fig 6) is much straighter and the distal end is much enlarged and bears on the end two long spines with four about half their length and several short ones at their bases. On the ventral protuberances are several spines instead of hairs as described for the type. At the base of the antennule is one lateral spine. The dorsal side of the shell (pl. vi, fig. 5) is serrate nearly to the head, the serrations decreasing in size and becoming farther apart anteriorly. The caudal end is marked by a very blunt protuberance. The lower margin is marked as in *Macrothrix tenuicornis*. The ventral spines extend nearly to the head.

Ostracoda were very abundant in numbers at all times except in the last of August. Only one species was found, *Cypris ophthalmica* Jurine. This is a very widely distributed species and occurs in all Europe, England, Scotland, Java, Paraguay, Celebes Islands, Zanzibar and in Minnesota, Georgia and Illinois.

Insect larvæ were found in fair abundance in all collections. They were common insects whose larvæ abound in such ponds everywhere. Specific determinations could not be made because of the absence of literature on the subject.

The mites were not very abundant, but one to several species were found in nearly every collection. *Limnesia histrionica* (Hermann), *Limnesia undulata* (Müller) and young specimens of some species of *Limnesia* were present. These are generally distributed forms, found in many parts of Europe and America. They prefer bodies of water with abundant vegetation. *Piona reighardi* (Wolcott) is an American species and has only been reported previously from the Mississippi valley, Michigan, Illinois, and Louisiana. It is found in ponds, lakes and sloughs connected with rivers. Some forms of this genus were found which were too young for specific identification. *Unionicola crassipes* (Müller) is also a very widely distrib-

uted form, found in Europe and America. In the United States it is reported from Michigan, Wisconsin and Nebraska. It is found in both large and small lakes and in cut-offs connected with rivers. It is one of the few plankton forms found in these collections. *Arrhenurus prominulus* Marshall is a new species described and named from my specimens by Doctor Ruth Marshall (Marshall, 1908). *Arrhenurus krameri* Koenike is also an American species. It has only been reported once before. That was from the head waters of the Flathead River, in British Columbia (Koenike, 1895). This is of special interest here because the Flathead River belongs to the Columbia system. This is the only mite found which had been recorded before from the west. Young *Arrhenuri* were also found. *Mideopsis orbicularis* (Müller) is another widely distributed species. It is found in Europe and America in lakes and ponds with abundant vegetation. An undetermined species of *Lebertia* was found. The genus is quite characteristic of the more northern and more alpine lakes. *Diplodontus despiciens* (Müller), young specimens of *Atractides*, an undescribed species of *Oxus*, and one of *Neumania* were also present. These are all widely distributed genera. All of the above forms are not only generally distributed in lakes and ponds with clear, cool water and much vegetation, they are also the forms commonly found in collections made in the latitude of Michigan and Wisconsin. They are therefore exactly the forms to be expected in this pond. Except *Arrhenurus krameri*, none of these species have been reported before west of the Rocky Mountains.

The pond is conspicuous for a large number of individuals representing a comparatively small number of species. With few exceptions, the species are those of wide distribution and are those characteristic of small bodies of water densely filled with vegetation. They are also the species common among the vegetation near the shore of larger lakes. Very few true plankton forms are found. The pond has been reduced in size by drainage and partly filled with debris until, in dry seasons, it is little more than a swamp, yet the shore fauna of a lake remains.

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EXPLANATION OF PLATE VI

FIG. 1. Map of Todd's Pond.

The dotted area is a swamp in winter and is covered with rushes.

Areas covered with trees are represented by "x x x x".

Points marked "B" and "W" are the places from which collections were made.

FIG. 2. *Stentor pyriformis*; view of the upper surface.

FIG. 3. *Stentor pyriformis*; lower surface of the same specimen shown in figure 2, viewed as a transparent object. The two drawings were made without moving the specimen. Both of the above show the macronuclei in their typical location and the green algal cells with which the body is filled.

FIG. 4. *Stentor pyriformis*; macronucleus, much enlarged, showing the micronuclei surrounding it.

FIG. 5. *Macrothrix laticornis* var.; showing the arrangement of the serrations on the dorsal side of the shell.

FIG. 6. *Macrothrix laticornis* var.; one antennule, showing the characteristic arrangement of the spines.